COMPLETE LISTING OF CLAIMS

IN ASCENDING ORDER WITH STATUS INDICATOR

Claim 1 (previously presented): A zoom lens system for forming a final image of an object, said system having an object side and an image side and forming a first intermediate real image between the object and the final image, said system comprising in order from the object side to the image side:

a first optical unit including at least two lens elements and located between the object and the first intermediate real image, said unit comprising at least one optical subunit which is moved to change the size (magnification) of the first intermediate real image; and

a second optical unit including at least two lens elements and located between the first intermediate real image and the final image, at least a portion of which is moved to change the size (magnification) of the final image;

wherein the zoom lens system has a zoom ratio of at least 10 to 1.

Claim 2 (original): The zoom lens system as recited in claim 1, the second optical unit comprising at least one optical subunit, and at least one of the optical subunits is movable to hold an axial position of the final image substantially stationary as the focal length of the system is changed.

Claim 3 (original): The zoom lens system as recited in claim 1, wherein the second optical unit comprises at least one optical subunit and at least one of the optical subunits in each of the first and second optical units moves continuously as the focal length of the system is changed.

Claim 4 (original): The zoom lens system as recited in claim 1, wherein the second optical unit comprises at least one optical subunit and at least one of the optical subunits in one of the first and second optical units is at least temporarily stationary while at least one of the optical subunits in the other of the first and second optical units moves as the focal length of the system is changed.

Claim 5 (original): The zoom lens system as recited in claim 1, wherein:

(a) the second optical unit comprises at least one optical subunit; and

(b) a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(i) the first motion can precede or follow the second motion;

(ii) for the first motion, at least one optical subunit of the first optical unit moves without movement of any optical subunit of the second optical unit; and

(iii) for the second motion, at least one optical subunit of the second optical unit moves without movement of any optical subunit of the first optical unit.

Claim 6 (original): The zoom lens system as recited in claim 5, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 7 (original): The zoom lens system as recited in claim 1, further comprising a focus unit on the object side of the first optical unit for focusing at least one of the intermediate and final images.

Claim 8 (original): The zoom lens system as recited in claim 1 wherein the first optical unit comprises an aperture stop and the system further comprises a pupil imaging unit located between the first and second optical units for imaging an exit pupil of the first optical unit to form an entrance pupil of the second optical unit.

Claim 9 (original): The zoom lens system as recited in claim 1 wherein the second optical unit comprises an aperture stop and the system further comprises a pupil imaging unit located between the first and second optical units for imaging an entrance pupil of the second optical unit to form an exit pupil of the first optical unit.

Claim 10 (original): The zoom lens system as recited in claim 1, further comprising an image stabilization unit on the image side of the second optical unit for stabilizing the final image.

Claim 11 (original): The zoom lens system as recited in claim 7, the focus unit comprising two optical subunits that are movable along the optical axis of the zoom lens system.

Claim 12 (original): The zoom lens system as recited in claim 11, wherein the optical axis is straight.

Claim 13 (original): The zoom lens system as recited in claim 7, the focus unit comprising seven or fewer lens elements.

Claim 14 (original): The zoom lens system as recited in claim 10, the image stabilization unit comprising at least one lens element that is laterally movable off the optical axis of the zoom lens system.

Claim 15 (original): The zoom lens system as recited in claim 10, the image stabilization unit comprising at least one lens element that is axially movable along the optical axis of the zoom lens system.

Claim 16 (original): The zoom lens system as recited in claim 10, the image stabilization unit comprising at least one laterally movable lens element that is laterally movable off the optical axis of the zoom lens system and at least one axially movable lens element that is axially movable along the optical axis, the at least one laterally movable lens element separated from the at least one axially movable lens element by an air gap, wherein radiation from the object and passing through the air gap is substantially collimated.

Claim 17 (original): The zoom lens system as recited in claim 14, wherein radiation from the object and passing through the system is substantially collimated at the at least one laterally movable lens element.

Claim 18 (original): The zoom lens system as recited in claim 15, wherein radiation from the object and passing through the system is substantially collimated at the at least one axially movable lens element.

Claim 19 (original): The zoom lens system as recited in claim 1, wherein one or more additional intermediate real images are formed between the object and the final image.

Claim 20 (original): The zoom lens system as recited in claim 19, further comprising one or more additional optical units for changing the size (magnification) of the one or more additional intermediate real images.

Claim 21 (original): The zoom lens system as recited in claim 1, wherein the first intermediate real image is formed in an air space between optical elements in the zoom lens system and remains in the air space during zooming.

Claim 22 (original): The zoom lens system as recited in claim 19, wherein the one or more additional intermediate real images are formed in one or more air spaces between optical elements in the zoom lens system and remain in the one or more air spaces during zooming.

Claim 23 (original): The zoom lens system of claim 1 wherein the system comprises at least one aspheric optical surface.

Claim 24 (original): The zoom lens system of claim 1 wherein the system comprises at least one diffractive optical surface.

Claim 25 (original): The zoom lens system of claim 1 wherein the system comprises at least one aspheric optical surface and at least one diffractive optical surface.

Claim 26 (previously presented): A zoom lens system for forming a final image of an object, said system forming a first intermediate real image between the object and the final image, said system comprising compounded first and second zoom lenses wherein the compounded first and second zoom lenses have controlled pupil imaging with respect to one another and wherein the zoom lens system has a zoom ratio of at least 10 to 1.

Claim 27 (original): The zoom lens system as recited in claim 26, wherein at least a portion of each of the first and second zoom lenses moves continuously as the focal length of the system is changed.

Claim 28 (original): The zoom lens system as recited in claim 26, wherein at least a portion of one of the first and second zoom lenses is at least temporarily stationary while at least a portion of the other of the first and second zoom lenses moves as the focal length of the system is changed.

Claim 29 (original): The zoom lens system as recited in claim 26, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the first zoom lens changes the focal length of the system; and

(c) for the second motion, only the second zoom lens changes the focal length of the system.

Claim 30 (original): The zoom lens system as recited in claim 29, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 31 (previously presented): A zoom lens system for forming a final image of an object, said system having an object side and an image side and comprising in order from the object side to the image side:

a zoom lens that forms an intermediate real image; and

a variable focal length relay system that receives the intermediate real image and changes its magnification to form the final image;

wherein the zoom lens system has a zoom ratio of at least 10 to 1.

Claim 32 (original): The zoom lens system as recited in claim 31, wherein at least a portion of each of the zoom lens and the relay system moves continuously as the focal length of the system is changed.

Claim 33 (original): The zoom lens system as recited in claim 31, wherein at least a portion of one of the zoom lens and the relay system is at least temporarily stationary while at least a portion of the other of the zoom lens and the relay system moves as the focal length of the system is changed.

Claim 34 (original): The zoom lens system as recited in claim 31, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the zoom lens changes the focal length of the system; and

(c) for the second motion, only the relay system changes the focal length of the system.

Claim 35 (original): The zoom lens system as recited in claim 34, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 36 (previously presented): A zoom lens system for forming a final image of an object, the zoom lens system having a range of focal lengths between a maximum focal length and a minimum focal length and forming at least a first intermediate real image between the object and the final image for all focal lengths within the range of focal lengths, the zoom lens system having an object side and an image side and comprising in order from the object side to the image side:

a first lens unit having a focal length that is changed to change the size (magnification) of the first intermediate real image, the first lens unit being located between the object and the first intermediate real image; and

a second lens unit for changing the size (magnification) of the final image, the second lens unit being located between the first intermediate real image and the final image;

wherein the zoom lens system has a zoom ratio of at least 10 to 1.

Claim 37 (original): The zoom lens system as recited in claim 36, wherein at least a portion of each of the first and second lens units moves continuously as the focal length of the system is changed.

Claim 38 (original): The zoom lens system as recited in claim 36, wherein at least a portion of one of the first and second lens units is at least temporarily stationary while at least a portion of the other of the first and second lens units moves as the focal length of the system is changed.

Claim 39 (original): The zoom lens system as recited in claim 36, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the first lens unit changes the focal length of the system; and

(c) for the second motion, only the second lens unit changes the focal length of the system.

Claim 40 (original): The zoom lens system as recited in claim 39, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 41 (previously presented): A zoom lens system having an object side and an image side and comprising in order from the object side to the image side:

a variable focal length lens unit that forms an intermediate real image of an object; and

a variable focal length lens unit that forms a real image of the intermediate real image;

wherein the zoom lens system has a zoom ratio of at least 10 to 1.

Claim 42 (original): The zoom lens system as recited in claim 41, wherein at least a portion of each of the variable focal length lens units moves continuously as the focal length of the system is changed.

Claim 43 (original): The zoom lens system as recited in claim 41, wherein at least a portion of one of one of the variable focal length lens units is at least temporarily stationary while at least a portion of the other of the variable focal length lens units moves as the focal length of the system is changed.

Claim 44 (original): The zoom lens system as recited in claim 41, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the variable focal length lens unit that forms the intermediate real image changes the focal length of the system; and

(c) for the second motion, only the variable focal length lens unit that forms a real image of the intermediate real image changes the focal length of the system.

Claim 45 (original): The zoom lens system as recited in claim 44, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 46 (previously presented): A compound zoom lens system for collecting radiation from an object and delivering the radiation to a sensor, said system comprising multiple zoom lens portions including a first zoom lens portion nearest to the object for forming an intermediate image of the object and a last zoom lens portion nearest to the sensor for delivering radiation from the intermediate image to the sensor, wherein the compound zoom lens system has a zoom ratio of at least 10 to 1.

Claim 47 (original): The compound zoom lens system as recited in claim 46, wherein at least a portion of each of the first and last zoom lens portions moves continuously as the focal length of the system is changed.

Claim 48 (original): The compound zoom lens system as recited in claim 46, wherein at least a portion of one of the first and last zoom lens portions is at least temporarily stationary while at least a portion of the other of the first and last zoom lens portions moves as the focal length of the system is changed.

Claim 49 (original): The compound zoom lens system as recited in claim 46, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the first zoom lens portion changes the focal length of the system; and

(c) for the second motion, only the last zoom lens portion changes the focal length of the system.

Claim 50 (original): The compound zoom lens system as recited in claim 49, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 51 (original): The compound zoom lens system as recited in claim 46 wherein the multiple zoom lens portions include only the first zoom lens portion and the last zoom lens portion.

Claim 52 (previously presented): A zoom lens system for forming a final image of an object, said system having a variable focal length, an optical axis, an aperture stop, and a chief ray that crosses the optical axis at the aperture stop, said system comprising:

two lens units for changing the focal length of the system and for forming the final image, one of the units having a variable focal length and the other unit having at least a portion that is moveable;

wherein the chief ray crosses the optical axis at at least one other location besides said aperture stop for all focal lengths of the system;

wherein the system forms an intermediate real image that is located between the two lens units for all focal lengths of the system; and

wherein the zoom lens system has a zoom ratio of at least 10 to 1.

Claim 53 (original): The zoom lens system as recited in claim 52, wherein the optical axis is straight.

Claim 54 (original): The zoom lens system as recited in claim 52, wherein the system has a lens surface closest to the object and the at least one other location at which the chief ray crosses the optical axis is between said lens surface and the final image for all focal lengths of the system.

Claim 55 (original): The zoom lens system as recited in claim 52, wherein at least a portion of each of the two lens units moves continuously as the focal length of the system is changed.

Claim 56 (original): The zoom lens system as recited in claim 52, wherein at least a portion of one of the two lens units is at least temporarily stationary while at least a portion of the other of the two lens units moves as the focal length of the system is changed.

Claim 57 (original): The zoom lens system as recited in claim 52, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the lens unit having a variable focal length changes the focal length of the system; and

(c) for the second motion, only the lens unit having at least a portion that is moveable changes the focal length of the system.

Claim 58 (original): The zoom lens system as recited in claim 57, wherein the change in the focal length of the system includes only a single first motion and a single second motion.

Claim 59 (currently amended): A zoom lens system comprising:

a zoom kernel for forming an intermediate real image; and

a zoom relay that zooms for magnifying the intermediate real image to form a final image;

wherein the zoom lens system has a zoom ratio of at least 10 to 1.

Claim 60 (original): The zoom lens system as recited in claim 59, wherein at least a portion of each of the zoom kernel and the zoom relay moves continuously as the focal length of the system is changed.

Claim 61 (original): The zoom lens system as recited in claim 59, wherein at least a portion of one of the zoom kernel and the zoom relay is at least temporarily stationary while at least a portion of the other of the zoom kernel and the zoom relay moves as the focal length of the system is changed.

Claim 62 (original): The zoom lens system as recited in claim 59, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the zoom kernel changes the focal length of the system; and

(c) for the second motion, only the zoom relay changes the focal length of the system.

Claim 63 (original): The zoom lens system as recited in claim 62, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 64 (original): The zoom lens system as recited in claim 59, the zoom kernel comprising a zoom lens having a + - + + construction.

Claim 65 (original): The zoom lens system as recited in claim 59, the zoom kernel comprising a zoom lens having a + - - + construction.

Claim 66 (original): The zoom lens system as recited in claim 59, the zoom kernel comprising a zoom lens having a - + construction.

Claim 67 (original): The zoom lens system as recited in claim 59, the zoom kernel comprising a zoom lens having a - + + construction.

Claim 68 (original): The zoom lens system as recited in claim 59, the zoom kernel comprising a zoom lens having a - + - + construction.

Claim 69 (original): The zoom lens system as recited in claim 59, the zoom relay comprising a zoom lens having a + - + + construction.

Claim 70 (original): The zoom lens system as recited in claim 59, the zoom relay comprising a zoom lens having a + - + construction.

Claim 71 (original): The zoom lens system as recited in claim 59, the zoom relay comprising a zoom lens having a - + construction.

Claim 72 (original): The zoom lens system as recited in claim 59, the zoom kernel comprising a first lens unit for focusing at least one of the intermediate and final images.

Claim 73 (original): The zoom lens system as recited in claim 72, wherein internal motions within the first lens unit are used to contribute to the correction of focus breathing.

Claim 74 (original): The zoom lens system as recited in claim 59, wherein the system comprises one or more lens elements each with at least one aspheric surface for contributing to the correction of at least one of distortion and spherical aberration.

Claim 75 (original): The zoom lens system as recited in claim 59, wherein the system comprises one or more fluor crown glass or calcium fluoride lens elements for contributing to the correction of color aberrations.

Claim 76 (original): The zoom lens system as recited in claim 59, wherein the system comprises one or more lens elements having a diffractive surface for contributing to the correction of color aberrations.

Claim 77 (original): A zoom lens system having a first lens unit that forms a real intermediate image and a second lens unit that forms a second image of the real intermediate image, said zoom lens system having a zoom ratio of at least 120 to 1.

Claim 78 (original): The zoom lens system as recited in claim 77 wherein the zoom ratio is at least 200 to 1.

Claim 79 (previously presented): A zoom lens system for forming a final image of an object, said system having an object side and an image side and forming a first intermediate real image between the object and the final image, said system comprising in order from the object side to the image side:

a first optical unit including at least two lens elements and located between the object and the first intermediate real image, said unit comprising at least one optical subunit which is moved to change the size (magnification) of the first intermediate real image; and

a second optical unit including at least two lens elements and located between the first intermediate real image and the final image, at least a portion of which is moved to change the size (magnification) of the final image;

wherein the optical subunit whose movement serves as the primary source of magnification change for the first optical unit has a negative power.

Claim 80 (previously presented): The zoom lens system as recited in claim 79, wherein the system has a zoom ratio of at least 10 to 1.

Claim 81 (previously presented): The zoom lens system as recited in claim 79, the second optical unit comprising at least one optical subunit, and at least one of the optical subunits is movable to hold an axial position of the final image substantially stationary as the focal length of the system is changed.

Claim 82 (previously presented): The zoom lens system as recited in claim 79, wherein the second optical unit comprises at least one optical subunit and at least one of the optical subunits in each of the first and second optical units moves continuously as the focal length of the system is changed.

Claim 83 (previously presented): The zoom lens system as recited in claim 79, wherein the second optical unit comprises at least one optical subunit and at least one of the optical subunits in one of the first and second optical units is at least temporarily stationary while at least one of the optical subunits in the other of the first and second optical units moves as the focal length of the system is changed.

Claim 84 (previously presented): The zoom lens system as recited in claim 79, wherein:

(a) the second optical unit comprises at least one optical subunit; and

(b) a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(i) the first motion can precede or follow the second motion;

(ii) for the first motion, at least one optical subunit of the first optical unit moves without movement of any optical subunit of the second optical unit; and

(iii) for the second motion, at least one optical subunit of the second optical unit moves without movement of any optical subunit of the first optical unit.

Claim 85 (previously presented): The zoom lens system as recited in claim 84, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 86 (previously presented): The zoom lens system as recited in claim 79, further comprising a focus unit on the object side of the first optical unit for focusing at least one of the intermediate and final images.

Claim 87 (previously presented): The zoom lens system as recited in claim 79 wherein the first optical unit comprises an aperture stop and the system further comprises a pupil imaging unit located between the first and second optical units for imaging an exit pupil of the first optical unit to form an entrance pupil of the second optical unit.

Claim 88 (previously presented): The zoom lens system as recited in claim 79 wherein the second optical unit comprises an aperture stop and the system further comprises a pupil imaging unit located between the first and second optical units for imaging an entrance pupil of the second optical unit to form an exit pupil of the first optical unit.

Claim 89 (previously presented): The zoom lens system as recited in claim 79, further comprising an image stabilization unit on the image side of the second optical unit for stabilizing the final image.

Claim 90 (previously presented): The zoom lens system as recited in claim 86, the focus unit comprising two optical subunits that are movable along the optical axis of the zoom lens system.

Claim 91 (previously presented): The zoom lens system as recited in claim 90, wherein the optical axis is straight.

Claim 92 (previously presented): The zoom lens system as recited in claim 86, the focus unit comprising seven or fewer lens elements.

Claim 93 (previously presented): The zoom lens system as recited in claim 89, the image stabilization unit comprising at least one lens element that is laterally movable off the optical axis of the zoom lens system.

Claim 94 (previously presented): The zoom lens system as recited in claim 89, the image stabilization unit comprising at least one lens element that is axially movable along the optical axis of the zoom lens system.

Claim 95 (previously presented): The zoom lens system as recited in claim 89, the image stabilization unit comprising at least one laterally movable lens element that is laterally movable off the optical axis of the zoom lens system and at least one axially movable lens element that is axially movable along the optical axis, the at least one laterally movable lens element separated from the at least one axially movable lens element by an air gap, wherein radiation from the object and passing through the air gap is substantially collimated.

Claim 96 (previously presented): The zoom lens system as recited in claim 93, wherein radiation from the object and passing through the system is substantially collimated at the at least one laterally movable lens element.

Claim 97 (previously presented): The zoom lens system as recited in claim 94, wherein radiation from the object and passing through the system is substantially collimated at the at least one axially movable lens element.

Claim 98 (previously presented): The zoom lens system as recited in claim 79, wherein one or more additional intermediate real images are formed between the object and the final image.

Claim 99 (previously presented): The zoom lens system as recited in claim 98, further comprising one or more additional optical units for changing the size (magnification) of the one or more additional intermediate real images.

Claim 100 (previously presented): The zoom lens system as recited in claim 79, wherein the first intermediate real image is formed in an air space between optical elements in the zoom lens system and remains in the air space during zooming.

Claim 101 (previously presented): The zoom lens system as recited in claim 98, wherein the one or more additional intermediate real images are formed in one or more air spaces between optical elements in the zoom lens system and remain in the one or more air spaces during zooming.

Claim 102 (previously presented): The zoom lens system of claim 79 wherein the system comprises at least one aspheric optical surface.

Claim 103 (previously presented): The zoom lens system of claim 79 wherein the system comprises at least one diffractive optical surface.

Claim 104 (previously presented): The zoom lens system of claim 79 wherein the system comprises at least one aspheric optical surface and at least one diffractive optical surface.

Claim 105 (previously presented): A zoom lens system for forming a final image of an object, said system forming a first intermediate real image between the object and the final image, said system comprising compounded first and second zoom lenses wherein the compounded first and second zoom lenses have controlled pupil imaging with respect to one another and wherein (i) the first of the compounded zoom lenses comprises an optical unit which has a negative power and (ii) movement of said optical unit serves as the primary source of magnification change for said first of the compounded zoom lenses.

Claim 106 (previously presented): The zoom lens system as recited in claim 105, wherein the system has a zoom ratio of at least 10 to 1.

Claim 107 (previously presented): The zoom lens system as recited in claim 105, wherein at least a portion of each of the first and second zoom lenses moves continuously as the focal length of the system is changed.

Claim 108 (previously presented): The zoom lens system as recited in claim 105, wherein at least a portion of one of the first and second zoom lenses is at least temporarily stationary while at least a portion of the other of the first and second zoom lenses moves as the focal length of the system is changed.

Claim 109 (previously presented): The zoom lens system as recited in claim 105, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the first zoom lens changes the focal length of the system; and

(c) for the second motion, only the second zoom lens changes the focal length of the system.

Claim 110 (previously presented): The zoom lens system as recited in claim 109, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 111 (previously presented): A zoom lens system for forming a final image of an object, said system having an object side and an image side and comprising in order from the object side to the image side:

a zoom lens that forms an intermediate real image; and

a variable focal length relay system that receives the intermediate real image and changes its magnification to form the final image;

wherein (i) the zoom lens that forms an intermediate real image comprises an optical unit which has a negative power and (ii) movement of said optical unit serves as the primary source of magnification change for said zoom lens that forms an intermediate real image.

Claim 112 (previously presented): The zoom lens system as recited in claim 111, wherein the system has a zoom ratio of at least 10 to 1.

Claim 113 (previously presented): The zoom lens system as recited in claim 111, wherein at least a portion of each of the zoom lens and the relay system moves continuously as the focal length of the system is changed.

Claim 114 (previously presented): The zoom lens system as recited in claim 111, wherein at least a portion of one of the zoom lens and the relay system is at least temporarily stationary while at least a portion of the other of the zoom lens and the relay system moves as the focal length of the system is changed.

Claim 115 (previously presented): The zoom lens system as recited in claim 111, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the zoom lens changes the focal length of the system; and

(c) for the second motion, only the relay system changes the focal length of the system.

Claim 116 (previously presented): The zoom lens system as recited in claim 115, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 117 (previously presented): A zoom lens system for forming a final image of an object, the zoom lens system having a range of focal lengths between a maximum focal length and a minimum focal length and forming at least a first intermediate real image between the object and the final image for all focal lengths within the range of focal lengths, the zoom lens system having an object side and an image side and comprising in order from the object side to the image side:

a first lens unit having a focal length that is changed to change the size (magnification) of the first intermediate real image, the first lens unit being located between the object and the first intermediate real image; and

a second lens unit for changing the size (magnification) of the final image, the second lens unit being located between the first intermediate real image and the final image;

wherein (i) the first lens unit comprises an optical subunit which has a negative power and (ii) movement of said optical subunit serves as the primary source of magnification change for said first lens unit.

Claim 118 (previously presented): The zoom lens system as recited in claim 117, wherein the system has a zoom ratio of at least 10 to 1.

Claim 119 (previously presented): The zoom lens system as recited in claim 117, wherein at least a portion of each of the first and second lens units moves continuously as the focal length of the system is changed.

Claim 120 (previously presented): The zoom lens system as recited in claim 117, wherein at least a portion of one of the first and second lens units is at least temporarily stationary while at least a portion of the other of the first and second lens units moves as the focal length of the system is changed.

Claim 121 (previously presented): The zoom lens system as recited in claim 117, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the first lens unit changes the focal length of the system; and

(c) for the second motion, only the second lens unit changes the focal length of the system.

Claim 122 (previously presented): The zoom lens system as recited in claim 121, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 123 (previously presented): A zoom lens system having an object side and an image side and comprising in order from the object side to the image side:

a variable focal length lens unit that forms an intermediate real image of an object; and

a variable focal length lens unit that forms a real image of the intermediate real image;

wherein (i) the variable focal length lens unit that forms the intermediate real image comprises an optical subunit which has a negative power and (ii) movement of said optical subunit serves as the primary source of magnification change for said variable focal length lens unit that forms the intermediate real image.

Claim 124 (previously presented): The zoom lens system as recited in claim 123, wherein the system has a zoom ratio of at least 10 to 1.

Claim 125 (previously presented): The zoom lens system as recited in claim 123, wherein at least a portion of each of the variable focal length lens units moves continuously as the focal length of the system is changed.

Claim 126 (previously presented): The zoom lens system as recited in claim 123, wherein at least a portion of one of one of the variable focal length lens units is at least temporarily stationary while at least a portion of the other of the variable focal length lens units moves as the focal length of the system is changed.

Claim 127 (previously presented): The zoom lens system as recited in claim 123, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the variable focal length lens unit that forms the intermediate real image changes the focal length of the system; and

(c) for the second motion, only the variable focal length lens unit that forms a real image of the intermediate real image changes the focal length of the system.

Claim 128 (previously presented): The zoom lens system as recited in claim 127, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 129 (previously presented): A compound zoom lens system for collecting radiation from an object and delivering the radiation to a sensor, said system comprising multiple zoom lens portions including a first zoom lens portion nearest to the object for forming an intermediate image of the object and a last zoom lens portion nearest to the sensor for delivering radiation from the intermediate image to the sensor, wherein (i) the first zoom lens portion comprises an optical unit which has a negative power and (ii) movement of said optical unit serves as the primary source of magnification change for said first zoom lens portion.

Claim 130 (previously presented): The compound zoom lens system as recited in claim 129, wherein the system has a zoom ratio of at least 10 to 1.

Claim 131 (previously presented): The compound zoom lens system as recited in claim 129, wherein at least a portion of each of the first and last zoom lens portions moves continuously as the focal length of the system is changed.

Claim 132 (previously presented): The compound zoom lens system as recited in claim 129, wherein at least a portion of one of the first and last zoom lens portions is at least temporarily stationary while at least a portion of the other of the first and last zoom lens portions moves as the focal length of the system is changed.

Claim 133 (previously presented): The compound zoom lens system as recited in claim 129, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the first zoom lens portion changes the focal length of the system; and

(c) for the second motion, only the last zoom lens portion changes the focal length of the system.

Claim 134 (previously presented): The compound zoom lens system as recited in claim 133, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 135 (previously presented): The compound zoom lens system as recited in claim 129 wherein the multiple zoom lens portions include only the first zoom lens portion and the last zoom lens portion.

Claim 136 (previously presented): A zoom lens system for forming a final image of an object, said system having a variable focal length, an optical axis, an aperture stop, and a chief ray that crosses the optical axis at the aperture stop, said system comprising:

two lens units for changing the focal length of the system and for forming the final image, one of the units having a variable focal length and the other unit having at least a portion that is moveable;

wherein the chief ray crosses the optical axis at at least one other location besides said aperture stop for all focal lengths of the system;

wherein the system forms an intermediate real image that is located between the two lens units for all focal lengths of the system; and

wherein (i) the unit that has a variable focal length comprises an optical subunit which has a negative power and (ii) movement of said optical subunit serves as the primary source of magnification change for said lens unit that has a variable focal length.

Claim 137 (previously presented): The zoom lens system as recited in claim 136, wherein the system has a zoom ratio of at least 10 to 1.

Claim 138 (previously presented): The zoom lens system as recited in claim 136, wherein the optical axis is straight.

Claim 139 (previously presented): The zoom lens system as recited in claim 136, wherein the system has a lens surface closest to the object and the at least one other location at which the chief ray crosses the optical axis is between said lens surface and the final image for all focal lengths of the system.

Claim 140 (previously presented): The zoom lens system as recited in claim 136, wherein at least a portion of each of the two lens units moves continuously as the focal length of the system is changed.

Claim 141 (previously presented): The zoom lens system as recited in claim 136, wherein at least a portion of one of the two lens units is at least temporarily stationary while at least a portion of the other of the two lens units moves as the focal length of the system is changed.

Claim 142 (previously presented): The zoom lens system as recited in claim 136, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the lens unit having a variable focal length changes the focal length of the system; and

(c) for the second motion, only the lens unit having at least a portion that is moveable changes the focal length of the system.

Claim 143 (previously presented): The zoom lens system as recited in claim 142, wherein the change in the focal length of the system includes only a single first motion and a single second motion.

Claim 144 (currently amended): A zoom lens system comprising:

a zoom kernel for forming an intermediate real image; and

a zoom relay that zooms for magnifying the intermediate real image to form a final image;

wherein (i) the zoom kernel comprises an optical unit which has a negative power and (ii) movement of said optical unit serves as the primary source of magnification change for said zoom kernel.

Claim 145 (previously presented): The zoom lens system as recited in claim 144, wherein the system has a zoom ratio of at least 10 to 1.

Claim 146 (previously presented): The zoom lens system as recited in claim 144, wherein at least a portion of each of the zoom kernel and the zoom relay moves continuously as the focal length of the system is changed.

Claim 147 (previously presented): The zoom lens system as recited in claim 144, wherein at least a portion of one of the zoom kernel and the zoom relay is at least temporarily stationary while at least a portion of the other of the zoom kernel and the zoom relay moves as the focal length of the system is changed.

Claim 148 (previously presented): The zoom lens system as recited in claim 144, wherein a change in the focal length of the system includes at least one first motion and at least one second motion wherein:

(a) the first motion can precede or follow the second motion;

(b) for the first motion, only the zoom kernel changes the focal length of the system; and

(c) for the second motion, only the zoom relay changes the focal length of the system.

Claim 149 (previously presented): The zoom lens system as recited in claim 148, wherein a change in the focal length of the system includes only a single first motion and a single second motion.

Claim 150 (previously presented): The zoom lens system as recited in claim 144, the zoom kernel comprising a zoom lens having a + - + + construction.

Claim 151 (previously presented): The zoom lens system as recited in claim 144, the zoom kernel comprising a zoom lens having a + - - + construction.

Claim 152 (previously presented): The zoom lens system as recited in claim 144, the zoom relay comprising a zoom lens having a + - + + construction.

Claim 153 (previously presented): The zoom lens system as recited in claim 144, the zoom relay comprising a zoom lens having a + - + construction.

Claim 154 (previously presented): The zoom lens system as recited in claim 144, the zoom relay comprising a zoom lens having a - + construction.

Claim 155 (previously presented): The zoom lens system as recited in claim 144, the zoom kernel comprising a first lens unit for focusing at least one of the intermediate and final images.

Claim 156 (previously presented): The zoom lens system as recited in claim 155, wherein internal motions within the first lens unit are used to contribute to the correction of focus breathing.

Claim 157 (previously presented): The zoom lens system as recited in claim 144, wherein the system comprises one or more lens elements each with at least one aspheric surface for contributing to the correction of at least one of distortion and spherical aberration.

Claim 158 (previously presented): The zoom lens system as recited in claim 144, wherein the system comprises one or more fluor crown glass or calcium fluoride lens elements for contributing to the correction of color aberrations.

Claim 159 (previously presented): The zoom lens system as recited in claim 144, wherein the system comprises one or more lens elements having a diffractive surface for contributing to the correction of color aberrations.

Claim 160 (previously presented): A zoom lens system having a first lens unit that forms a real intermediate image and a second lens unit that forms a second image of the real intermediate image, said zoom lens system having a zoom ratio of at least 120 to 1, wherein (i) the first lens unit comprises an optical subunit which has a negative power and (ii) movement of said optical subunit serves as the primary source of magnification change for said first lens unit.

Claim 161 (previously presented): The zoom lens system as recited in claim 160 wherein the zoom ratio is at least 200 to 1.